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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,114	07/29/2003	Charles H. Dennison	MI22-2346	8334
21567	7590	03/29/2004	EXAMINER	
WELLS ST. JOHN P.S. 601 W. FIRST AVENUE, SUITE 1300 SPOKANE, WA 99201			ROCCHEGIANI, RENZO	
			ART UNIT	PAPER NUMBER
			2825	

DATE MAILED: 03/29/2004.

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/630,114

Applicant(s)

DENNISON, CHARLES H.

Examiner

Renzo N. Rocchegiani

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 42-59 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 42-59 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>7/29/2003, 11/26/2003</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 42-46, 49, 51, and 54-57 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,081,021 (Gambino et al.).

Gambino et al. disclose a semiconductor assembly comprising an insulative mass (item 307) across a first and second electrical nodes that comprise metals such as aluminum separated by dielectric material laterally adjacent thereto (Fig. 4, and col. 5, lines 15-20). The mass has been patterned to have a pair of opening to uncover the two nodes. (Fig. 5, items 320 and 330). A dielectric layer, such as silicon nitride about 5 to 200 nm thick (col. 5, lines 25-30, item 322), is present on the sidewalls of the openings and on the bottom of only one of the openings. (Fig. 7). Two conductive plugs are present in the opening wherein one is in contact with one of the nodes while the other is separated from the node by way of the dielectric layer formed in the via. (Fig. 8, item 324). Wherein the node (310) covered with the layer of nitride forms an antifuse. (col. 4, lines 45-50) The other node and conductive plug are incorporated into an interconnect construction. (col. 4, lines 45-55). The conductive plugs comprise a metal such as aluminum or titanium or copper or tungsten and may comprise multilayer

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structures. (col. 5, lines 5-15). In patterning the dielectric layer that is deposited in the vias, Gambino et al. disclose the use of a mask. (col. 6, lines 35-42).

Whether the patterning of the insulative mass to form the openings to exposes the nodes was carried out simultaneously or in different steps is not limiting since such limitation is a process limitation and this is a device claim and in product by process claims the Patent Office follows *In re Thorpe* and does not give weight to the process steps.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 47-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,081,021 (Gambino et al.) in view of U.S. Patent No. 5,191,241 (McCollum et al.) and in further view of U.S. Patent No. 5,110,754 (Lowrey et al.).

As stated in paragraph 2, all the limitations of the claims have been met except for teaching that the nodes comprise n-type and p-type regions.

McCollum et al. teach the formation of an antifuse (item 336) in an integrated circuit wherein the nodes comprise source and drain regions doped in the substrate (items 314 and 316, and col. 6, lines 20-25).

Lowrey et al. teach the formation of an antifuse wherein the nodes comprise n-type and p-type regions. (Fig. 13)

It would have been obvious to one having ordinary skill in the art to have the node regions comprise n-type and p-type, since Gambino et al. discloses that the nodes in its invention are interconnect structures, because McCollum teaches a very similar structure that Gambino et al. disclose except that it is more specific as to what the interconnect structure would be connected to, i.e. separate source and drain regions, and since Lowrey et al. teach what such source and drain regions are made of, i.e. n-type and p-type dopant, thus in light of the teachings of these three references one with ordinary skill in the art would recognize that these elements work together and thus would have an expectation of success in combining them.

5. Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,081,021 (Gambino et al.) in view of U.S. Patent No. 5,110,754 (Lowrey et al.).

As stated in paragraph 2, all the limitations of the claims have been met except for teaching that the plug is formed with polysilicon.

Lowrey et al. teach the formation of an antifuse wherein the nodes comprise n-type and p-type regions (Fig. 13) and wherein the plug comprises a metal or polysilicon. (col. 4, lines 33-45).

It would have been obvious to one having ordinary skill in the art to use polysilicon for the plugs, since it has been held to be within the general skill of a worker

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in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

6. Claims 50, 52 and 58 rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,081,021 (Gambino et al.) in view of U.S. Patent No. 5,171,715 (Husher et al.).

As stated in paragraph 2, all the limitations of the claims have been met except for teaching that the node and the plug are a mixture of aluminum and copper.

Husher et al. teach the formation of an antifuse wherein the node and the plug are a mixture of aluminum and copper. (col. 5, lines 1-9 and col. 7, lines 1-9).

It would have been obvious to one having ordinary skill in the art to form the node and plugs of a mixture of aluminum and copper, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

7. Claim 59 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,081,021 (Gambino et al.) in view of U.S. Patent No. 6,087,677 (Wu).

As stated in paragraph 2, all the limitations of the claims have been met except for specifying that the plug comprises TiN and W.

Wu teaches an antifuse wherein the plug may comprise TiN and W. (col. 1, lines 45-50).

It would have been obvious to one with ordinary skill in the specific art to combine the teachings of Wu to those of Gambino, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its

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suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renzo Rocchegiani whose telephone number is (571) 272-1904. The examiner can normally be reached on Monday through Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached at (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

RNR

March 10, 2004



MATTHEW SMITH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800